

APPENDIX OF CLAIMS

1. A method of manufacturing a crystal of a III-V compound of a nitride system, the method comprising:

growing a crystal of a III-V compound of the nitride system having a predetermined thickness on a surface of a basal body,

wherein the growth step comprises:

forming a first plurality of patterns of at least one pitch, in one position in a direction of a thickness of the crystal; and

forming a second plurality of patterns of at least one pitch, in another position in the direction of the thickness of the crystal;

wherein the second plurality of patterns at least partly overlies said first plurality of patterns in the direction of the thickness of the crystal and at least partly does not overlie said first plurality of patterns in the direction of the thickness of the crystal; and

wherein said at least one pitch of pattern elements of said first plurality of patterns and said at least one pitch of pattern elements of said second plurality of patterns are different from each other.

2. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 1,

wherein each of the first and second plurality of patterns takes form in pattern elements arranged in one direction in a plane almost parallel to the surface of the basal body.

4. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 2,

wherein a relationship between the pitch of the pattern elements of one of the first plurality of patterns and the pitch of the pattern elements of one of the second plurality of patterns is:

$$0.1 \mu\text{m} < p_1 \times p_2 / |p_2 - p_1| < 5000 \mu\text{m}$$

where p_1 denotes the pitch of the pattern elements of one of the first plurality of patterns and p_2 denotes the pitch of the pattern elements of one of the second plurality of patterns.

5. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 2,

wherein at least one of the first and second plurality of patterns each has pattern elements arranged in a plurality of different pitches.

6. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 2,

wherein at least one of the first and second plurality of patterns has one of pattern elements arranged at a plurality of different intervals and has pattern elements of a plurality of different lengths in the direction of the arrangement of the pattern elements.

7. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 2,

wherein the pattern elements of each of the first and second plurality of patterns are in a form of stripes.

8. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 1,

wherein each of the first and second plurality of patterns takes form in pattern elements arranged in two directions in a plane almost parallel to the surface of the basal body.

9. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 8,

wherein there is a region where the second plurality of patterns overlies the first plurality of patterns in the direction of the thickness of the crystal and a region where the first plurality of patterns does not overlie the second plurality of patterns in the direction of the thickness of the crystal, and both regions coexist in one direction of the two directions.

10. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 8,

wherein there is a region where the second plurality of patterns overlie the first plurality of patterns in the direction of the thickness of the crystal and a region where the second plurality of patterns does not overlie the first plurality of patterns in the direction of the thickness of the crystal, and both regions coexist in both of the two directions.

11. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 1,

wherein the growth step further comprises:

a first pattern formation step in which a first pattern is formed one of directly on the basal body and on the basal body with a base layer in between;

a first growth step in which an intermediate layer as part of the crystal is deposited on one of the surface of the basal body and on the surface of the base layer with the first pattern formed thereon;

a second pattern formation step in which a second pattern is formed on the surface of the intermediate layer deposited in the first growth step; and

a second growth step in which a top layer as part of the crystal is deposited on the surface of the intermediate layer with the second pattern formed thereon.

12. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 11,

wherein at least one of the first pattern and the second pattern is comprised of a masking material.

13. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 12,

wherein the masking material includes silicon (Si) and at least one selected from the group consisting of oxygen (O) and nitrogen (N).

14. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 11,

wherein the basal body comprises one of sapphire (Al_2O_3), silicon (Si), silicon carbide (SiC), gallium arsenide (GaAs), magnesium aluminum composite oxide (MgAl_2O_4), lithium gallium composite dioxide (LiGaO_2) and gallium nitride (GaN).

15. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 11,

wherein the base layer is deposited by growing a III-V compound of the nitride system on the basal body.

16. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 15,

wherein the first pattern formation step comprises:

forming the first pattern by deposition of a masking material on the surface of the base layer,

and the growth step further comprises:

between the first pattern formation step and the first growth step,

a step of selectively etching the base layer through the first pattern as a mask.

17. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 15,

wherein the second pattern formation step comprises:

forming the second pattern by deposition of a masking material on the intermediate layer deposited in the first growth step,

and the growth step further comprises

between the second pattern formation step and the second growth step,

a step of selectively etching the intermediate layer through the second pattern as a mask; and

step of removing the masking material of the second pattern.

18. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 11,

wherein the first pattern formation step comprises:

forming the first pattern by forming an indentation in one of the surface of the basal body and in the surface of the base layer.

19. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 11,

wherein the second pattern formation step comprises:

forming the second pattern by forming an indentation in the surface of the intermediate layer deposited in the first growth step.

20. A method of manufacturing a crystal of a III-V compound of a nitride system as claimed in claim 11, further comprising:

separating at least the basal body from the crystal.

23. A method of manufacturing a device by forming a device film on a surface of one of a crystal substrate and a crystal film, the method comprising:

forming one of the crystal substrate and the crystal film in a growth step by growing a crystal of a III-V compound of a nitride system having a thickness on a surface of a basal body; and

forming a device film on one of the crystal substrate and on the crystal film in a device film step,

wherein the growth step comprises:

forming a first plurality of patterns of at least one pitch in one position in a direction of the thickness of the crystal; and

forming a second plurality of patterns of at least one pitch, in another position in the direction of the thickness of the crystal;

wherein the first plurality of patterns at least partly overlies the second plurality of patterns in the direction of the thickness of the crystal and at least partly does not overlie the second plurality of patterns in the direction of the thickness of the crystal; and

wherein the at least one pitch of pattern elements of the first plurality of patterns and the at least one pitch of pattern elements of the second plurality of patterns are different from each other.

24. A method of manufacturing a device as claimed in claim 23, further comprising:

separating the basal body from one of the crystal substrate and from the crystal film.

25. A method of manufacturing a crystal of a III-V compound of a nitride system, the method comprising:

growing a crystal of a III-V compound of the nitride system having a predetermined thickness on a surface of a basal body,

wherein the growth step comprises:

forming a first plurality of patterns of at least one pitch, in one position in a direction of a thickness of the crystal;

forming a second plurality of patterns of at least one pitch, in another position in the direction of the thickness of the crystal;

wherein each of said first and said second plurality of patterns take form in pattern elements and at least one pattern element of said second plurality of patterns overlies a pattern element of said first plurality of patterns in the direction of the thickness of the crystal and at least one pattern element of said second plurality of patterns does not overlie a pattern element of said first plurality of patterns in the direction of the thickness of the crystal; and

wherein said at least one pitch of pattern elements of said first plurality of patterns and said at least one pitch of pattern elements of said second plurality of patterns are different from each other.

26. A method of manufacturing a device by forming a device film on a surface of one of a crystal substrate and a crystal film, the method comprising:

forming one of the crystal substrate and the crystal film in a growth step by growing a crystal of a III-V compound of a nitride system having a thickness on a surface of a basal body; and

forming a device film on one of the crystal substrate and on the crystal film in a device film step,

wherein the growth step comprises:

forming a first plurality of patterns of at least one pitch in one position in a direction of the thickness of the crystal;

forming a second plurality of patterns of at least one pitch, in another position in the direction of the thickness of the crystal;

wherein each of said first and said second plurality of patterns take form in pattern elements and at least one pattern element of said first plurality of patterns overlies a pattern element of said second plurality of patterns in the direction of the thickness of the crystal and at least one pattern element of said first plurality of patterns does not overlie a pattern element of said second plurality of patterns in the direction of the thickness of the crystal; and

wherein the at least one pitch of pattern elements of the first plurality of patterns and the at least one pitch of pattern elements of the second plurality of patterns are different from each other.